City of Salina Raw Water Supply Study

Planning Session with Salina City Commission

March 2, 2009
2:30 PM

Introductions

- HDR
  - Donald Lindeman, Project Manager
- Wilson & Company
  - Jason Schlickbernd, Asst. Project Manager
- Layne Christensen
  - Luca DeAngelis Hydrogeologist

Agenda for Today

- Raw Water Supply Study Scope
- Work completed to since last update:
  - Conservation Plan
  - Water Reuse
  - Alternatives
    - New Sources of Supply
    - Alternatives Process
    - Preliminary Screening
    - Alternatives Evaluation Criteria
- What's Next

Summary of
Raw Water Supply Study

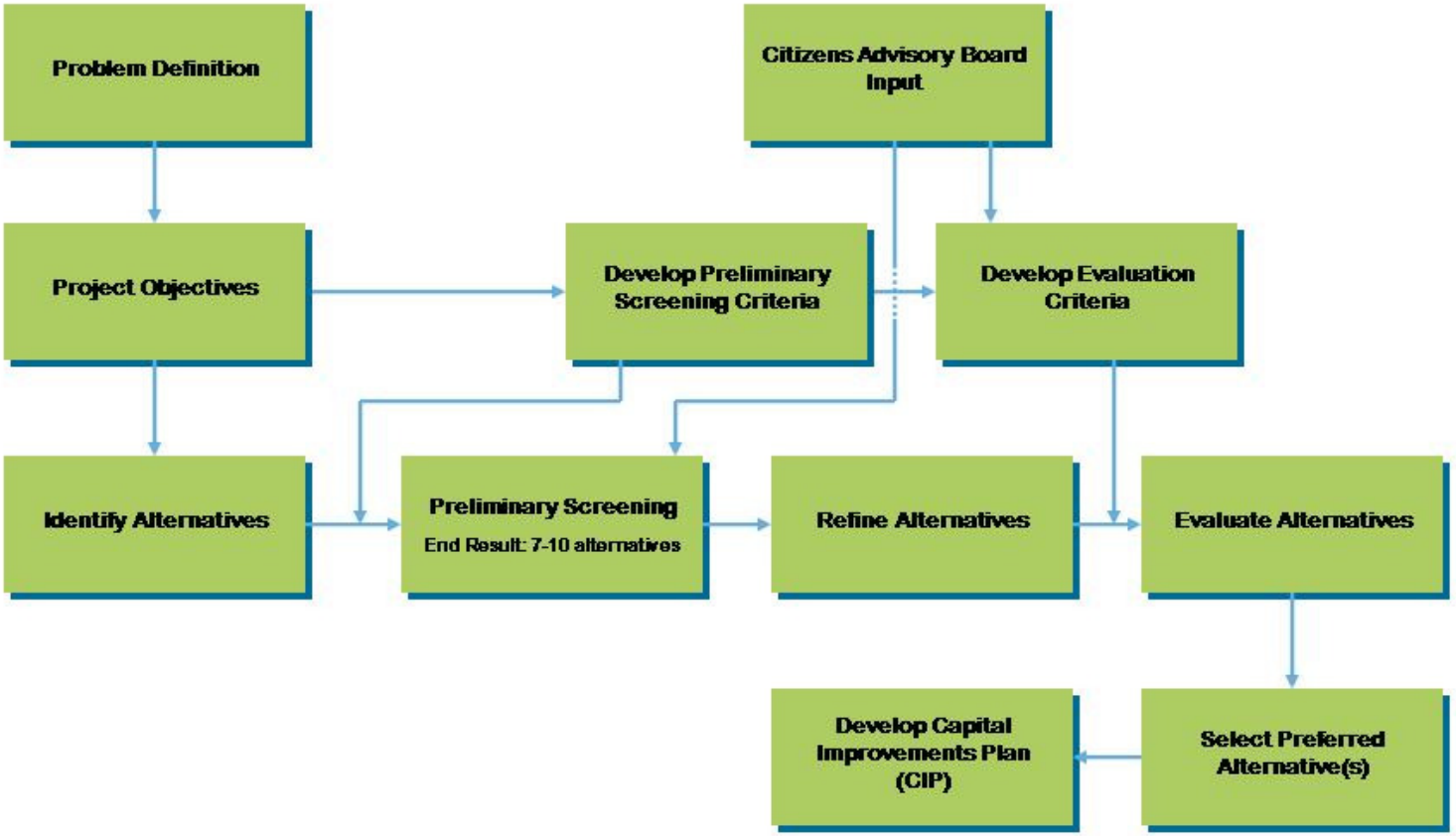
Scope of Study

- Water Demand Projections – July, 2008
- Water Rights/Regulatory Review – Sept/Oct 2008
- Existing Sources of Supply – Oct/Nov, 2008
- Conservation Plan – Nov/Dec, 2008
  - Present at a later date
- Alternatives Evaluation – Jan/Feb/Mar, 2009
  - Identify potential new sources of supply
  - Alternatives evaluation
  - Pull selected options together (new sources, optimization of existing sources, conservation, reuse) into Capital Improvements Plan (CIP)
- Reuse Evaluation – Nov/Dec, 2008
  - Regulatory requirements, flows, applications, costs

Alternatives Process

Alternatives Process

- Systematic way to evaluate potential alternatives



Problem Definition/Project Objectives

- Problem Definition
  - Decreased reliability of raw water supplies during drought conditions
  - Contamination issues with existing wells
  - Need water supplies to meet growing demands
- Project Objectives
  - Increase the reliability of raw water supplies, especially during drought conditions
  - Support economic growth and development
  - Optimize existing infrastructure where possible
  - Minimize risks to the City and its customers
  - Cost effective solutions – “most bang for the buck”

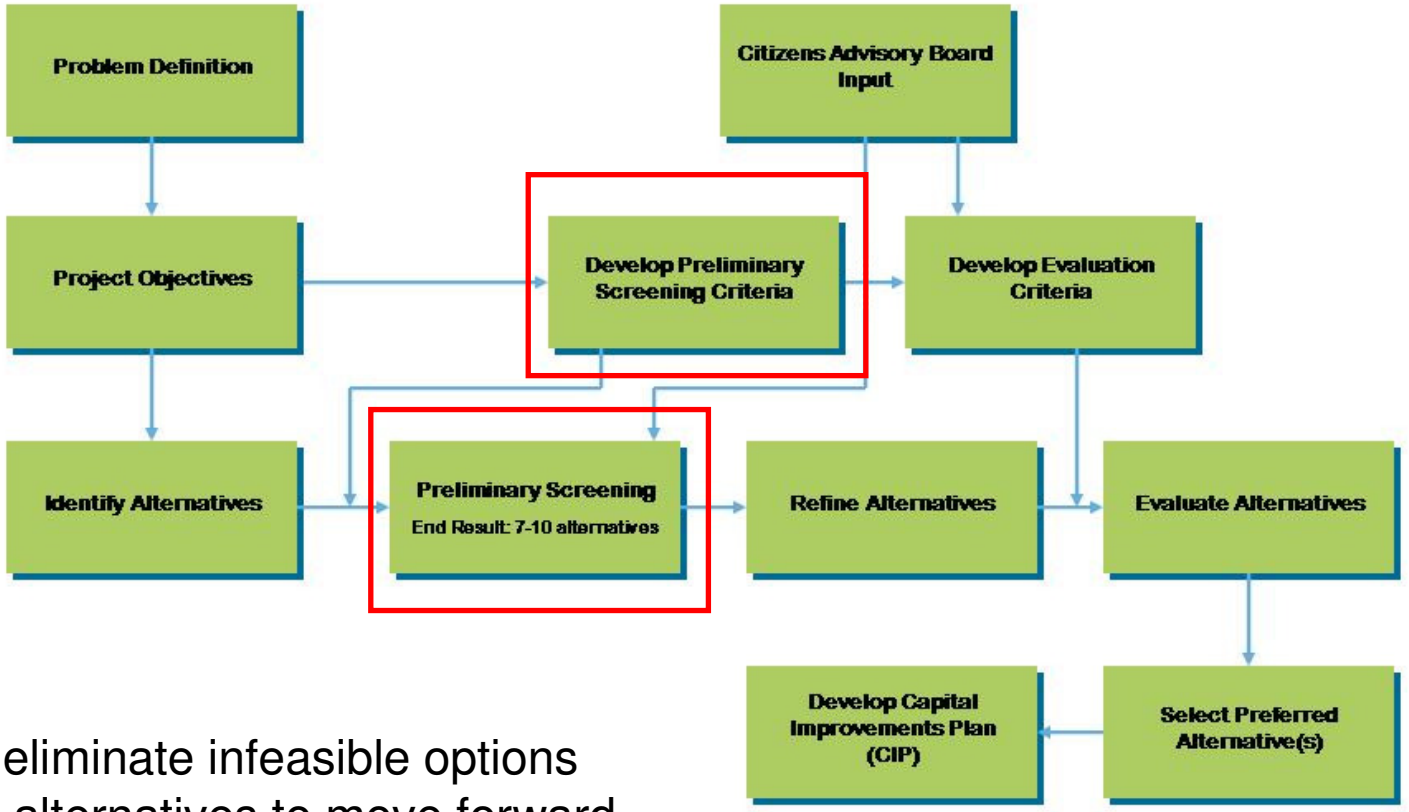
Identification of Alternatives

1) Improvements at Downtown Wellfield
2) Improvements at South Wellfield
3) Seasonal surface water right
4) Kanopolis Reservoir *
5) Milford Reservoir *
6) Wilson Reservoir *
7) Saline River *
8) Confluence of Smoky Hill and Solomon Rivers *
9) Dakota Aquifer *
10) Construct a reservoir *
11) Acquire existing water rights *
12) Water Assurance District *
13) Aquifer recharge
    - Infiltration ponds
    - Direct recharge wells
    - Infiltration through oxbow
14) Water reuse
    - All irrigation + industrial sites
    - All irrigation sites
    - City-owned irrigation sites

* New Sources of Supply

Preliminary Screening of Alternatives

Preliminary Screening of Alternatives



- Objective: eliminate infeasible options
- Goal: 7-10 alternatives to move forward
- Simple pass/fail analysis

Preliminary Screening Criteria

- Related to the project objectives
- Five general criteria:
  - Optimizes existing resources
    - Includes water rights, raw water infrastructure, treatment infrastructure
  - Increases reliability during drought
    - Includes increased reliability of existing sources and new sources that are independent of existing sources
  - Minimizes implementation risk
    - Includes effectiveness of alternative, public issues, historical use for water supply, permitting, approval, and development processes
  - Expandable for future demands
    - Includes availability for future water rights, physically expandable
  - Cost effective
    - Most bang for the buck
    - Capital costs only – does not include O&M costs
      - 30% contingencies for unknown work
      - 20% factor for engineering, legal, etc

Preliminary Screening – Downtown Wellfield

- Improvements at Downtown Wellfield
  - Criterion 1: Optimizes existing resources - PASS
    - Re-drill 5 wells, treat contamination, upsize air strippers to maximize existing water right of 15.2 MGD
  - Criterion 2: Increases reliability during drought – PASS/FAIL
    - Same drought-prone source historically used by City
    - Partially increases reliability if all wells can be used
    - Reliability can be further increased with passive/direct recharge
  - Criterion 3: Minimizes implementation risk - PASS
    - Minimal risk since it has historically been used by City
  - Criterion 4: Expandable for future demands - FAIL
    - Area closed to further appropriations – cannot drill more wells
  - Criterion 5: Cost effective
    - Total cost - $6.4 million
    - Cost/gallon - $2.13/gallon (based on 3 MGD)

Preliminary Screening – South Wellfield

- Improvements at South Wellfield
  - Criterion 1: Optimizes existing resources - PASS
    - Re-drill 2 wells to maximize existing water right of 3.7 MGD
    - Construct treatment plant to reduce iron/manganese/hardness
  - Criterion 2: Increases reliability during drought - PASS
    - Considered an additional source to increase reliability
    - Well spacing increases reliability compared to Downtown Wellfield and groundwater not over-developed
  - Criterion 3: Minimizes implementation risk - PASS
    - Conventional treatment capable of treating iron, manganese, and hardness with minimal permitting risk
  - Criterion 4: Expandable for future demands - PASS
    - May be able to obtain additional water rights or acquire existing water rights
  - Criterion 5: Cost effective
    - Total cost - $15.2 million
    - Cost/gallon - $4.10/gallon (based on 3.7 MGD)



Preliminary Screening – Seasonal Water Right

- Seasonal Water Right on Smoky Hill River
  - Criterion 1: Optimizes existing resources - PASS
    - Use to meet demands during October - June
    - Optimizes wellfields and existing Smoky Hill River water right so that they can be used during times of peak usage
    - Need a new intake, pump station, and treatment for taste & odor
  - Criterion 2: Increases reliability during drought – PASS/FAIL
    - Preserves aquifer levels and surface water right for peak usage
    - May be times when cannot use seasonal right due to low flows
  - Criterion 3: Minimizes implementation risk - PASS
    - Smoky Hill River already used as a source
  - Criterion 4: Expandable for future demands - PASS
    - May be able to obtain additional seasonal water rights
  - Criterion 5: Cost effective
    - Total cost - $5.1 million
    - Cost/gallon - $0.51/gallon (based on 10 MGD)

Kanopolis Reservoir

- Approximately 27 miles southwest of Salina
- Owned and operated by the USACE to regulate flows in the Smoky Hill River
- Current yield projection – 6.5 MGD in 2047
  - During a 50-year drought
- Current allocations – 1.096 MGD to Post Rock
- Current applications – 23.525 MGD
  - Reservoir potentially overcommitted
- Would require 27+ miles of pipeline to convey
- Investigation of 2’ pool raise to raise yield
  - Not considered a near-term possibility

Preliminary Screening – Kanopolis Reservoir

- Kanopolis Reservoir
  - Criterion 1: Optimizes existing resources - FAIL
    - Need an intake, pump station, and 27+ miles of pipeline
  - Criterion 2: Increases reliability during drought – PASS/FAIL
    - New source for City; decreased Smoky Hill River flows correspond with low levels in Kanopolis Reservoir
  - Criterion 3: Minimizes implementation risk - FAIL
    - Risk in ability to obtain storage in the reservoir – over-committed
  - Criterion 4: Expandable for future demands - FAIL
    - Safe yield of reservoir will decrease in future due to sedimentation
  - Criterion 5: Cost effective
    - Total cost - $14.0 million
    - Cost/gallon - $7.02/gallon (based on 2 MGD)
    - $113,000 in 2009 to purchase storage (annual cost)

Milford Reservoir

- Approximately 45 miles east of Salina
- Owned and operated by the USACE to regulate flows in the Republican River
- Better water quality than supplies near Salina
- Current allocations
  - 38 MGD in use (Westar Energy, Kansas River WAD #1)
  - 75 MGD currently not opened for allocations
- Different river basin – increases reliability
- Would likely require inter-basin transfer
  - Long permitting process with DWR
  - May encounter resistance from eastern water users
- Would require 45+ miles of pipeline to convey

Preliminary Screening – Milford Reservoir

- Milford Reservoir
  - Criterion 1: Optimizes existing resources - FAIL
    - Need an intake, pump stations, and 45+ miles of pipeline
  - Criterion 2: Increases reliability during drought - PASS
    - New source for City; different river-basin than current sources
  - Criterion 3: Minimizes implementation risk - FAIL
    - Risk in ability to obtain storage in the reservoir – 75 MGD is allocated for future water supply but has not been opened up
    - Risk in potential inter-basin transfer requirements
  - Criterion 4: Expandable for future demands - PASS
    - 75 MGD of storage not currently opened up
  - Criterion 5: Cost effective
    - Total cost - $30.8 million
    - Cost/gallon - $6.16/gallon (based on 5 MGD)
    - $113,000 in 2009 to purchase storage (annual cost)

Wilson Reservoir

- Approximately 55 miles west of Salina
- Operated by the USACE to regulate flows in the Saline River
- Water quality – high in salinity
  - Would require reverse osmosis treatment
- Currently no storage allocated for supply
  - Has never been used for water supply
  - KWO investigating buying storage
- Would require 55+ miles of pipeline to convey

Preliminary Screening – Wilson Reservoir

- Wilson Reservoir
  - Criterion 1: Optimizes existing resources - FAIL
    - Need an intake, pump stations, and 55+ miles of pipeline, reverse osmosis treatment facility, disposal of concentrate
  - Criterion 2: Increases reliability during drought – PASS/FAIL
    - New source for City; decreased Smoky Hill River flows may correspond with low levels in Wilson Reservoir – same basin
  - Criterion 3: Minimizes implementation risk - FAIL
    - Has not been used as a water supply source
    - Risk in ability to obtain storage in the reservoir – no allocation for water supply
    - Risk in development and permitting of RO facility
  - Criterion 4: Expandable for future demands - PASS/FAIL
    - Possibly – depends if KWO purchases storage and how much they purchase
  - Criterion 5: Cost effective
    - Total cost - $70.5 million
    - Cost/gallon - $14.10/gallon (based on 5 MGD)
    - $113,000 in 2009 to purchase storage (annual cost)

Saline River

- Approximately 5 miles northeast of Salina
- Under-developed in terms of water rights
  - Opportunity for seniority
  - Availability for expansion
- Subject to drought conditions similar to Smoky Hill R.
- Poor water quality – high salinity
  - TDS is 1,150 ppm vs 576 ppm at Smoky Hill River
  - Requires desalination treatment process (reverse osmosis)
- Would likely use river bank filtration wells
  - Not limited to time of year for withdrawal
  - Provides some pre-treatment of the water
  - Series of vertical wells OR horizontal collector well

Preliminary Screening – Saline River

- Saline River
  - Criterion 1: Optimizes existing resources - FAIL
    - Need wells to withdraw, reverse osmosis treatment facility, disposal of concentrate, pump station, 5+ miles of pipeline
  - Criterion 2: Increases reliability during drought - PASS/FAIL
    - New source for City; decreased Smoky Hill River flows may correspond with low flows in Saline River – same basin
  - Criterion 3: Minimizes implementation risk - FAIL
    - Has not been used as a water supply source (municipal)
    - Risk in development and permitting of RO facility
  - Criterion 4: Expandable for future demands - PASS
    - Not over-developed with water rights
  - Criterion 5: Cost effective
    - Total cost - $41.3 million
    - Cost/gallon - $8.25/gallon (based on 5 MGD)

Confluence of Smoky Hill and Solomon Rivers

- Approximately 13 miles northeast of Salina
- Under-developed in terms of water rights
  - Opportunity for seniority
  - Availability for expansion
- More reliable flow conditions than Smoky Hill River near Salina
- Poor water quality – high salinity
  - TDS is 1,150 ppm vs 576 ppm at Smoky Hill River
  - Requires desalination treatment process (reverse osmosis)
- Would likely use river bank filtration wells

Preliminary Screening – Confluence

- Confluence of Smoky Hill River and Solomon River
  - Criterion 1: Optimizes existing resources - FAIL
    - Need wells to withdraw, reverse osmosis treatment facility, disposal of concentrate, pump station, 13+ miles of pipeline
  - Criterion 2: Increases reliability during drought - PASS
    - New source for City; more flow in river near confluence during past droughts due to Saline River and Solomon River
  - Criterion 3: Minimizes implementation risk - PASS/FAIL
    - Currently used for municipal water supply
    - Risk in development and permitting of RO facility
  - Criterion 4: Expandable for future demands - PASS
    - Not over-developed with water rights
  - Criterion 5: Cost effective
    - Total cost - $46.4 million
    - Cost/gallon - $9.28/gallon (based on 5 MGD)

Dakota Aquifer

- Used for many uses in central and SW Kansas
- Lower unit forms valley walls of Smoky Hill River near Salina
  - Low yield wells
  - City of Gypsum – wells produce 45-50 gpm
- Upper unit to the north and west of Salina
  - Well yields from 50 to 300 gpm
- Variable water quality
  - Depending on location can be high in salinity
  - Salinity increases to the west
  - Varies from 250 ppm to 2,000 ppm

Preliminary Screening – Dakota Aquifer

- Dakota Aquifer
  - Criterion 1: Optimizes existing resources - FAIL
    - Low yield wells – need many of them (24 for 5 MGD @ 150 gpm per well)
    - Need wells to withdraw, pump stations, 30+ miles of pipeline (due to well spacing requirements – depends where in Dakota Aquifer)
  - Criterion 2: Increases reliability during drought - PASS
    - New source for City that is independent of drought-impacted sources
  - Criterion 3: Minimizes implementation risk - FAIL
    - Aquifer highly variable in yield and water quality
  - Criterion 4: Expandable for future demands - PASS
    - Not over-developed with water rights
  - Criterion 5: Cost effective
    - Total cost - $31.2 million
    - Cost/gallon - $6.24/gallon (based on 5 MGD)

Reservoir Construction

- Reservoir for water supply, recreation, flood control
- Considerations:
  - Need water right for diversion
  - Extensive permitting with DWR
  - Land purchase for dam, area covered by water, area for spillway, and mitigation
  - Possible road and utility relocations
  - Environmental impacts and possible mitigation
  - Development of recreation facilities
  - Sedimentation of reservoir and reduction in inflows
  - Intake, pump station, and pipeline
- Time for design, permitting, construction
  - Still need additional sources in the interim

Preliminary Screening – Const. Reservoir

- Construct a Water Supply Reservoir
  - Criterion 1: Optimizes existing resources - FAIL
    - Assume can treat at existing WTP if surface water not in use
    - Need reservoir (25,000 AF), intake, pump station, 5+ miles of pipeline (depends on site)
  - Criterion 2: Increases reliability during drought - PASS
    - New source for City; inflows into reservoir likely decreased during drought
  - Criterion 3: Minimizes implementation risk - FAIL
    - Risk in permitting and development of reservoir – long lead time
    - Risk with dam breaks/flooding and loss of life/property
  - Criterion 4: Expandable for future demands - PASS/FAIL
    - Design for planning horizon
    - Yield of reservoir will decrease in future due to sedimentation
  - Criterion 5: Cost effective
    - Total cost - $162 million
    - Cost/gallon - $32.48/gallon (based on 5 MGD)
    - Does not include costs for relocating roads and utilities, etc

Acquisition of Existing Water Rights

- Includes surface water and groundwater rights
- Common method in western Kansas
- Considerations for purchasing water rights
  - Find willing sellers
  - Find water rights that are senior to Salina
  - Find large water right volumes close to existing infrastructure
- Considerations for implementing
  - Wells would likely need to be replaced
  - Change in Point of Diversion from DWR (can only move a well at most ½ mile from current location)
  - Change in Use Made of Water and Change in the Place of Use for conversion to municipal and use in Salina
  - Permitted volume and rate likely reduced upon conversion



Preliminary Screening – Existing Water Rights

- Acquire Existing Water Rights
  - Criterion 1: Optimizes existing resources - FAIL
    - If acquire groundwater rights – need to re-drill wells
    - If acquire surface water rights – need to construct intake
  - Criterion 2: Increases reliability during drought - PASS/FAIL
    - Likely the same sources as existing sources
    - Water rights acquired would be spread out over aquifer and not as impacted by over-pumping
  - Criterion 3: Minimizes implementation risk - PASS
    - Normal permitting with DWR as long as don't move well over ½ mile
    - Willing sellers minimize risk
  - Criterion 4: Expandable for future demands - PASS
    - Could obtain additional water rights
  - Criterion 5: Cost effective
    - Total cost - $20.2 million
    - Cost/gallon - $4.05/gallon (based on 5 MGD)
    - Costs depend on how many water rights are acquired and location

Water Assurance District Development

- Municipal and industrial users along a river join together to purchase storage in upstream reservoir for drought periods
  - "Insurance policy" for water availability when streamflows are low
- USACE/KWO operate reservoir to release the stored flow to the Water Assurance District users
- Currently 3 water assurance districts in Kansas
- Salina owns water rights on the Smoky Hill River
  - No storage allocated for water assurance districts in Kanopolis Reservoir
- Currently irrigation users are not included in district
  - KWO is considering allowing them to be part of the district



Preliminary Screening – Water Assurance District

- Form a Water Assurance District (Kanopolis Reservoir)
  - Criterion 1: Optimizes existing resources - PASS
    - Use Smoky Hill River for conveyance and use existing intake
  - Criterion 2: Increases reliability during drought – PASS/FAIL
    - Would be a water supply source that is ensured to be available during droughts; Kanopolis may see low levels during a drought
    - Does not guarantee water purchased will make it to Salina (loss to aquifer)
  - Criterion 3: Minimizes implementation risk - FAIL
    - No storage in Kanopolis Reservoir allocated for Water Assurance District
    - Significant development time
  - Criterion 4: Expandable for future demands - FAIL
    - Yield of Kanopolis Reservoir will only decrease in the future due to sedimentation
  - Criterion 5: Cost effective
    - Costs vary by Water Assurance District, member, and reservoir
    - Must pay for storage even if don't use it that year
    - Only use the storage when needed

Aquifer Recharge Summary

- Maintain elevated water levels within the aquifer so that water is available when it is needed
- Active recharge: infiltrate or directly inject water into the aquifer to increase water levels
  - Requires a water source
  - Recharge features must be upgradient of the wellfield to have impact
  - Active aquifer recharge has limited benefit due to stream/aquifer interaction

Active Recharge Methods	Advantages	Disadvantages
Infiltration Ponds	• Relatively simple • Do not need to treat source water	• Prone to siltation • Water deficit due to evaporation • No existing features near wellfield • Space intensive
Infiltration through Oxbow	• Good location to benefit wellfield	• Limited infiltration through channel bottom • Flow in channel may be depleted during high pumping times
Direct Recharge Wells	• Likely do not need to treat water source if using bank storage diversion wells • Do not need a lot of space • Can place wells to directly benefit wellfield	• Expensive • Permitting with DWR to for Underground Injection Control Class V Permit

Preliminary Screening – Aquifer Recharge

- Aquifer Recharge
  - Criterion 1: Optimizes existing resources – PASS/FAIL
    - Temporarily increases aquifer levels to optimize existing wellfields
    - Need bank storage diversion wells or off-season water right as source
    - May not optimize wellfield during drought years if can't withdraw water
  - Criterion 2: Increases reliability during drought – PASS/FAIL
    - Increases aquifer levels for wellfields during a drought
    - During drought years may not be able to withdraw water for recharge
  - Criterion 3: Minimizes implementation risk - FAIL
    - Unknown if recharge will be effective due to alluvium/river interaction
    - Risk with permitting with DWR
  - Criterion 4: Expandable for future demands - FAIL
    - The aquifer can only be recharged so much
    - Wellfields can only be optimized so much
  - Criterion 5: Cost effective
    - Total cost - $7.8 million
    - Cost/gallon - $1.56/gallon (based on 5 MGD)

Water Reuse Summary

- Many sites use private wells/water rights for irrigation
- Infrastructure needs:
  - Filtration (per KDHE requirements to irrigate athletic fields)
  - Additional disinfection (likely needed to increase inactivation of pathogens for irrigating athletic fields)
  - Storage and pumping facilities
  - Pipeline
- Alternative 1 – serve all irrigation and industrial sites
- Alternative 2 – serve all irrigation sites
- Alternative 3 – serve City-owned irrigation sites
  - Bill Burke Park, Salina Municipal Golf Course, E. Crawford Rec.
  - Excludes Soccer Complex

Alternative	Average Day Demand (MGD)	Maximum Day Demand (MGD)	Approximate Storage Requirement (Gallons)	Approximate Pipeline Length (miles)	Estimated Pipe Size (in.)
1	2.12	5.00	1,000,000	12.8	16, 8
2	1.70	3.67	600,000	6.5	16
3	0.64	1.90	200,000	3.4	10

Preliminary Screening – Water Reuse

- Water Reuse – 3 alternatives
  - All irrigation + industrial sites
  - All irrigation sites
  - City-owned irrigation sites (excluding Soccer Complex)
  - Criterion 1: Optimizes existing resources - PASS
    - Utilizes existing wastewater treatment infrastructure
    - Puts wastewater to beneficial use rather than discharging to river
    - Need additional treatment and pipeline
  - Criterion 2: Increases reliability during drought - FAIL
    - Does not save much from the municipal system (0.2 MGD – 0.6 MGD on average)
  - Criterion 3: Minimizes implementation risk – PASS/FAIL
    - Risk with public acceptance and effect of water quality on vegetation; however it has been done in Kansas successfully
  - Criterion 4: Expandable for future demands - PASS
    - Up to 3 MGD for consistent supply of reclaimed water
    - Minimum flow into wastewater treatment plant will increase as the City grows



Preliminary Screening – Water Reuse (con't)

- Water Reuse – 3 alternatives (continued)
  - All irrigation + industrial sites
  - All irrigation sites
  - City-owned irrigation sites (excluding Soccer Complex)
  - Criterion 5: Cost effective
    - All irrigation + industrial sites
      - Total cost – $16.6 million
      - Cost per gallon – $3.33/gallon
      - 0.61 MGD saved from municipal water supply system
    - All irrigation sites
      - Total cost – $11.7 million
      - Cost per gallon – $3.20/gallon
      - 0.19 MGD saved from municipal water supply system
    - City-owned irrigation sites (excluding Soccer Complex)
      - Total cost – $6.1 million
      - Cost per gallon – $3.19/gallon
      - 0.13 MGD saved from municipal water supply system

*Water reuse only viable if City obtains additional water rights or funded by private entity

Preliminary Screening Information

- Summary of Costs

Alternative	Capacity (MGD)	Total Construction Cost	Other Costs	Total Project Costs	Cost/gal
Seasonal Water Right	10.00	$4,235,000	$847,000	$5,082,000	$0.51
Aquifer Recharge - Recharge Wells	5.00	$6,512,000	$1,302,000	$7,814,000	$1.56
Downtown Wellfield	3.00	$5,317,000	$1,063,000	$6,380,000	$2.13
Water Reuse City-owned irrigation	1.90	$5,051,000	$1,010,000	$6,061,000	$3.19
Water Reuse all irrigation	3.67	$9,790,000	$1,958,000	$11,748,000	$3.20
Water Reuse all industrial + irrigation	5.00	$13,863,000	$2,773,000	$16,636,000	$3.33
Acquire Existing Water Rights	5.00	$16,857,000	$3,371,000	$20,228,000	$4.05
South Wellfield	3.70	$12,648,000	$2,530,000	$15,178,000	$4.10
Milford Reservoir	5.00	$25,649,000	$5,130,000	$30,779,000	$6.16
Dakota Aquifer	5.00	$26,008,000	$5,202,000	$31,210,000	$6.24
Kanopolis Reservor	2.00	$11,701,000	$2,340,000	$14,041,000	$7.02
Saline River	5.00	$34,381,000	$6,876,000	$41,257,000	$8.25
Confluence	5.00	$38,662,000	$7,732,000	$46,394,000	$9.28
Wilson Reservoir	5.00	$58,738,500	$11,748,000	$70,486,500	$14.10
Reservoir Constuction	5.00	$135,350,800	$27,070,000	$162,420,800	$32.48

Natural Breakpoint

*Water Assurance District – costs unknown but assumed to be above the breakpoint line. Only cost is annual cost to purchase the storage.

Preliminary Screening Results

- Conservation considered as a “side item”
- Water Assurance District stays in plan but cannot depend on it for all of water supply
- Acquisition of existing water rights always an option

Alternatives	Preliminary Screening Criteria - # Passing					Total # Passing Criteria
	Optimizes Existing Resources	Increases Reliability during Drought Periods	Minimizes Implementation Risk	Expandable for Future Demands	Cost Effective (above natural breakpoint)	
Improvements at South Wellfield	4				1	5
Obtain a seasonal surface water right	3.5				1	4.5
Improvements at Downtown Wellfield	2.5				1	3.5
Confluence of Smoky Hill and Solomon Rivers	2.5				1	3.5
Acquisition of existing water rights	2.5				1	3.5
Water reuse	2.5				1	3.5
Milford Reservoir	2				1	3
Dakota Aquifer	2				1	3
Saline River	1.5				1	2.5
Develop a water assurance district	1.5				1	2.5
Aquifer recharge	1				1	2
Kanopolis Reservoir	0.5				1	1.5
Construct a water supply reservoir	1.5				0	1.5
Wilson Reservoir	1				0	1

Alternatives Evaluation Criteria

Evaluation Criteria (CAB Comments)

- More detailed than preliminary screening criteria
- What is important in comparing alternatives to one another?
  - Optimizes existing resources
  - Increases reliability during drought
  - Minimizes implementation risk (includes public acceptance)
  - Expandable for future demand
  - Cost effective
  - ~~Flexible for phased implementation~~
  - Minimizes environmental impacts
  - Desirable water quality
  - Permitability
  - Sustainability
  - **Time to Implement**

What's Next

- Alternatives Evaluation
  - Evaluate alternatives with respect to 10 criteria
    - Assign 1, 2, or 3 for each criteria
    - 1 is low, 2 is moderate, 3 is high
    - Example – South Wellfield ranks high in optimizing existing infrastructure, so give it a 3
    - Each criteria receives a weighting factor
  - Rank alternatives according to evaluation results
    - "Menu of Options"
- Develop capital improvements plan (CIP)
  - Identify water needs according to selected alternatives
  - Identify short-term and long-term projects
- Prepare Draft and Final Reports
- Next City Commission Briefing – March 23, 2009

Questions?